compound is a liquid of pleasant odour, reminding one at the same time of ether and of weak ammonia. It reduces Fehling's solution with great energy upon gently warming, and silver nitrate in the cold. It vigorously attacks caoutchouc. Its hydrochloride contains two molecules of hydrogen chloride, and crystallises well in plates melting at 160°. The symmetrical di-ethyl hydrazine behaves in a most interesting manner with certain oxidising agents, particularly mercuric oxide. The yellow oxide reacts in a most violent manner, but the red oxide affords a more manageable reaction; the products are a large quantity of mercury di-ethyl, $Hg(C_2H_5)_2$, and a smaller quantity of azoethane, $C_2H_5N=NC_2H_5$, the ethyl analogue of the well-known azobenzene. The symmetrical and unsymmetrical di-ethyl hydrazines are clearly distinguished by their reactions with nitrous acid, for while the latter yields di-ethylamine and nitrous oxide, the former affords ethyl nitrite together with a smaller quantity of a nitroso compound.

The additions to the Zoological Society's Gardens during the past week include two Bonnet Monkeys (*Macacus sinicus*, ♂ ♂) from India, presented respectively by Mr. Philip E. Morel and Miss Ling; a Common Marmoset (*Hapale iacchus*) from Brazil, presented by Mr. A. E. W. Burns; a Brush-tailed Kangaroo (*Petrogale penicillata*, ♀) from New South Wales, presented by Lady Isabel Clayton; three Australian Cranes (*Grus australasiana*) from Australia, a Brown Crane (*Grus canadensis*) from North America, an Indian White Crane (*Grus leucogeranus*) from India, presented by Mr. E. W. Marshall; two Californian Quails (*Callipepla californica*) from California, presented by Mr. H. H. Howard Vyse; a Ground Hornbill (*Bucorvus abyssinicus*), from Nyassaland, presented by Mr. H. H. Johnston, C.B.; three Pratincoles (*Glareola pratincola*), four Night Herons (*Nycticorax griseus*), a Great Bustard (*Otis tarda*), South European, presented by Lord Lilford; three Dwarf Chameleons (*Chamaeleon pumilus*) from South Africa, presented by Mr. C. Stonham; two Cerastes Vipers (*Vipera cerastes*), two Egyptian Eryx (*Eryx jaculus*), a Cliffords Snake (*Zamenis cliffordi*) from Egypt, deposited; A Simonys Lizard (*Lacerta simonyi*) from the Island of Hiero, Canaries, presented by Mr. Sydney Crompton; a Deadly Snake (*Trigonocephalus atrox*) from Trinidad, presented by Messrs. Mole and Urich; an Axis Deer (*Cervus axis*), a Rufous Rat Kangaroo, *Hypsiprymnus rufescens*) born in the Gardens.

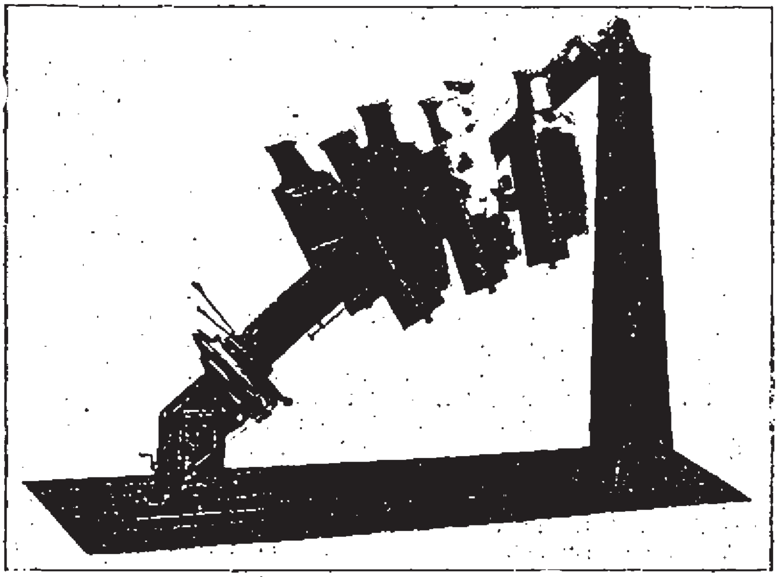
OUR ASTRONOMICAL COLUMN.

An Instrument for Photographing Meteors.—Up to the present time meteoric astronomy has had little, if any, instrumental equipment to further its development, the nature of the phenomena rendering simple naked eye observations the only available means of research. It is true that even now we know of a very considerable number of radiant points, and what is more, we have been able to note the daily movements of some of these in the heavens; but this knowledge has only been gained by the great patience and perseverance of astronomers, the most notable being Mr. W. F. Denning. With a thorough knowledge of the constellations, a good globe or star-map, and an accurate eye, he has been able to plot down track after track of these travellers through space, deducing from their paths the points in the heavens from which they are coming.

What will most probably lead to a great advance in the determination of the positions of these radiant points, is the introduction of photography for recording permanently the visible tracks in the sky. There may have been many attempts already for photographing these trails, and the writer himself a few years back, with an ordinary camera, was fortunate enough to catch nine trails on the sensitive plate. The camera being fixed and not equatorially mounted, the star images were consequently curved arcs, and not points. Even on this plate fairly accurate positions of the trails could have been obtained.

A somewhat unique instrument for locating the tracts of meteors and their radiant points, has recently been constructed by Messrs. Warner and Swazey for the Yale University Observatory. The accompanying illustration of the instrument is from *Popular Astronomy* for September.

The illustration shows the polar axis of the "English" form carrying a number of cameras. The axis is of a tubular form, about twelve feet long, the ends working on pivots which are capable of adjustment. The southern support is connected with clockwork, while that at the northern end is supported on a pillar in which are the driving weights in connection with the clock by cords passing under the floor. On the declination axis are fitted two arms which serve as supports to the cameras, three cameras being on the eastern and three on the western side. These cameras are so oriented that they take, in their respective fields, adjoining portions of the sky, so that altogether they cover a very large area. The instrument is supplied with slow motions, both in right ascension and declination, and the clockwork has an electric control. Whether satisfactory results have yet been obtained, one cannot say, but the apparatus was intended to be used for the Perseid swarm of October last.



SUN-SPOT OBSERVATIONS AT THE POTSDAM OBSERVATORY

In the publications of the "Potsdam Astrophysical Observations," Dr. Sporer has previously (No. 17) presented us with the observations of the sun-spots for the years 1880 to 1884. The most recent addition to these records will be found in No. 32, in which are collected the sun-spot observations for the years 1885 to 1893. The observations themselves are given in all details, being grouped together with regard to the period of rotation. These are followed by a brief discussion, from which these notes and extracts have been made.

The following table, bringing together the results relative to

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frequency and positions (as regards latitude) of the spots may be first given, as many references will be made to the numbers therein :—

Year.	Frequency.			Mean heliographic latitude.		
	Northern hemisphere.	Southern hemisphere.	Both hemispheres.	Northern hemisphere.	Southern hemisphere.	Both hemispheres.
				°	°	°
1870	738	765	1503	+17·0	−18·9	17·9
1871	545	605	1150	17·8	14·8	16·2
1872	523	618	1141	16·0	13·2	14·5
1873	323	415	745	13·3	11·2	12·1
1874	249	246	495	11·0	11·2	11·1
1875	108	85	193	11·0	10·4	10·9
1876	44	81	125	10·3	10·0	10·1
1877	48	66	114	8·3	9·7	9·1
1878	30	10	40	7·8	7·0	7·6
1879	11	3	14	8·3	6·1	7·8
1877	3		3	29·3		29·3
1878	1	1	2	34·4	20·2	27·3
1879	23	37	60	24·5	21·9	22·5
1880	218	156	374	20·0	20·3	20·1
1881	318	252	570	18·0	19·9	18·8
1882	366	311	677	15·4	16·9	16·1
1883	286	546	832	11·5	13·4	12·7
1884	373	460	833	10·5	11·9	11·3
1885	198	444	642	10·2	12·2	11·6
1886	103	226	329	9·9	10·5	10·3
1887	53	120	173	8·5	0·2	8·5
1888	22	80	102	5·9	6·9	6·7
1889	12	44	56	6·3	6·2	6·2
1890	2	9	11	3·5	7·9	7·1
1889	6	27	33	25·8	23·3	23·7
1890	64	71	135	22·2	25·0	23·7
1891	383	142	525	19·8	19·9	19·9
1892	453	416	869	15·3	20·2	17·6
1893	437	627	1064	14·4	15·3	14·9

From the table above, it will be seen that the minimum of 1878 was followed after 5·2 years by a maximum in 1884·0. The mean heliographic latitude of the spots at this period of maximum decreased to 12°, which is lower than was the case at the preceding maximum. Following this a minimum in 1889·5 occurred, the precession of spots disappearing at the mean latitude of 7°, and a new series beginning in 1889 at 40° on the southern hemisphere, and somewhat later at 23° and 35° on the northern hemisphere. Higher latitudes were at times recorded, the highest occurring in September 1893 and amounting to 42°. The mean yearly heliographic latitude for 1893 diminished to 15°. For the earlier part of the present year five periods of rotation have given for the mean latitude also 15°, indicating, when compared with the two foregoing periods, a further decrease in the numbers representing the "frequency." The time of maximum then can apparently be placed at 1893·5, but this would most probably have to be altered if the more recent observations show a further rising.

An examination of the Carrington observations also shows this movement in the heliographic latitude. Wolf, to explain it, suggested the existence of currents, which commenced with a minimum on both hemispheres in high latitudes, and continued to the following minimum towards lower latitudes. As indications of these currents, it might be stated that at the times of maximum suitable stripes appear on the meridian, which are for a long time free from spots and faculæ. This suggests that "special channels exist from time to time for the hypothetical currents."

Dr. Sporer next examines the old sun-spot observations for finding out the period from the "rate" of the heliographic latitudes. The cases he takes into consideration show, as he says, "eine genügende Uebereinstimmung mit den neueren Beobachtungen in Betreff des Ganges der mittleren heliographischen Breite während der Häufigkeits perioden. Dagegen scheinen nach dem Jahre 1644 in einen Zeitraume von 70 Jahren wesentlich andere Verhältnisse geherrscht zu haben."

Different records, he goes on to say, agree that from 1645-70 the spots observed were few. After this the number increased, reaching an important maximum in 1716. It was even then remarked (in 1715) that it was curious to note that spots were visible on different parts of the solar disc at the same time. In 1704 and the following year, one case occurred in which spots at the same time, but on two different positions of the disc, were seen; it was here expressly stated that such had not been observed for sixty years. Other instances (two) of this "scarce" case occurred in 1707. In 1716, spots were seen for several days, in eight different places on the disc.

Bringing together the positions of the observed spots, as regards latitude, Dr. Spörer adds that from 1671-1713 none were found in high latitudes. The highest (in 1703) was 19°. Previous to this, from November 1700, the latitude lay between 2° and 12°. At this time higher latitudes had been normal, because from May 1695-Nov. 1700 not a single spot had been observed. For this reason Prof. Wolf is stated to have assumed a minimum (1698·0), and determined the following minimum 1712·0, the authenticated records giving the information that no spot appeared in the years 1711 and 1712.

Some interesting facts may be stated now regarding the spots on the respective northern and southern hemispheres. The deficiency of spots for the former is "noch besonders hervorzuheben." In 1671, during two periods of rotation, a spot (12° N. Lat.) was observed. In 1705 and 1707 a spot is also cited to have been seen, but the northern hemisphere was free from them until 1713, and it was not till 1714 that they were then found to be numerous; thus one can hardly assume that, besides those recorded on the northern hemisphere, more spots in greater number appeared, for Cassini mentioned expressly, from the observation of a spot from the year 1707, "the spot deficiency of the northern hemisphere," and at the same time remarked "that the constitution of the northern hemisphere was different in a certain manner from that of the southern hemisphere." A glance at the records for the period 1644-1670 also shows that in the "period of seventy years on the northern hemisphere certainly no periodicity of spots had occurred."

The behaviour of the two hemispheres, as regarded in the light of more recent observations, is also very striking, and since 1883 the southern hemisphere has received the greater preponderance of spots. This continued to be the case during the minimum, and only discontinued when a rise of the number of spots had begun on the two hemispheres. The year 1891 was a critical year, on account of the astonishing change that was brought about.

While on the southern hemisphere the number of spots only slowly increased, that on the northern hemisphere attained considerably greater proportions. The resulting ratio for the spots during the year 1891 was as 8 : 3 for the northern and southern hemisphere respectively. The nature of this preponderance for the northern hemisphere was not more than temporary, for in 1892 it had greatly diminished, and the southern hemisphere had again attained its old position. Last year the proportion for the northern and southern was as 7 : 10.

The division of the spots with regard to their heliographic latitude displays also differences for the two hemispheres. A table bringing together the results for five periods of rotation indicates a great difference in the mean values of the heliographic latitudes; this difference, on the other hand, is to a certain extent eliminated if one deals with the yearly mean.

Reference is made also to the great change that occurs in the "Rotationswinkel" of some spots. "The most simple case for such a difference of the angle of rotation teaches us, if only in the first instance a spot with a penumbra is present, that a division takes place, which results in the appearance of two separate spots. Such spots regularly move away from one another, each having a separate penumbra. The observations furnish examples which show that the distance of the spots for many days continually increases, and that the angle of rotation of the preceding spot is very considerably greater than that of the following one." The observations included in this volume contain examples of these in great number.

W. J. L.

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